Title: A traffic flow with a bottelneck
Author: Adam Kovařík
Department: Department of Numerical Mathematics
Supervisor: prof. RNDr. Vladimír Janovský, DrSc.
Supervisor's e-mail address: janovsky@karlin.mff.cuni.cz

Abstract: In this paper we study a microscopic follow-the-leader traffic model on a circular road with a bottleneck. We assume that all drivers are identical and overtaking is not permitted. We sketch a small part of the rich dynamics of the model including Hopf and Neimark-Sacker bifurcations. We introduce so called POM and quasi-POM solutions and an algorithm how to search them. The main goal of this work is to investigate how the optimal velocity model with a bottleneck deals with so called aggressive behavior of drivers. The effect of variable reaction time and a combination of both named factors is also tested. Using numerical simulations we'll find out that aggressiveness and faster reactions have positive effect on traffic flow. In the end we discuss models with two bottlenecks and with one extraordinary driver.

Keywords: dynamical systems, ODEs, traffic flow, bottleneck, aggressiveness.